Massachusetts Urban Forestry Program

The Citizen Forester

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Soil is Not a Dirty Word - Eric Seaborn, Program Coordinator

"….the Earth…where a thin blanket of air, a thinner film of water, and the thinnest veneer of soil combine to support a web of life of wondrous diversity in continuous change." - Jack Eddy [1]

Let's get one thing straight, soil is not dirt. Soil is a complex material comprised of mineral and organic matter, water, air and organisms that supports the growth of plant life and, by extension, almost all life as we know it. Dirt is the "stuff you get under your fingernails and on your pants when you work," as a college professor of mine used to say.

As "tree people" we can never over estimate the importance of healthy soil and its vital contribution to healthy trees and forests. In fact, most of the forestry and arboricultural text books that I have read state quite clearly that, **soil characteristics have a greater influence on tree health than any other single factor**. [2] Soil provides critical inputs for tree growth including moisture and oxygen, nutrients, and a medium in which the tree finds stability for growth. Anything that impairs the ability of soil to deliver these vital growth factors can lead to serious decline or even death of the tree.

An idealized healthy soil contains about 45% mineral matter, the result of perhaps millions of years of breaking down (**weathering**) of underlying rock, 5% organic material including organisms and their remains, and 50% pore spaces that contain both air and water. The mineral matter in the soil determines the **soil texture**, meaning the relative fineness or coarseness of the soil.[3] Texture is the result of the relative amounts of sand, silt, and clay found in the soil and plays a key role in determining the ability of the soil to hold water and to provide oxygen to trees. This idealized composition of soil is likely more common to the open forest and meadow of undisturbed "natural" areas. As we shall discuss later, the situation in urban settings is often radically different.

Most people understand that soil provides key nutrients for plant growth and that the breakdown of organic matter adds enriching nutrient inputs. Less intuitive is the fact that the soil under your feet is one half pore space. But, the **porosity** of the soil is an important characteristic determining the ability of the soil to support tree growth. In simplistic terms, there are two kinds of pore spaces in soils – macropores, that ideally function to provide air to tree roots and help water percolate throughout the soil, and micropores that hold soil moisture that can then be accessed by the tree roots. Pore space and the clumping together of soil matter into clusters (**aggregates**) determines the soil

structure, which, like texture, helps to determine the water and air holding capacity of the soil and has a major effect upon root growth. Soil structure, particularly formation of aggregates, is heavily influenced by the amount and quality of organic matter contained in the soil. Roots growing in soils that have good structure will find water accessible in micropores and adequate air in the macropores and will be able to grow into the spaces between the aggregates as the tree matures. Again, in urban settings, the scenario is often very different.

Another key factor affecting soil health is its relative acidity or alkalinity, or **pH.** On the pH scale, a measurement of 7 means that the soil is chemically neutral, less than 7 becomes progressively more acidic and more than 7 becomes more basic. The pH of the soil is important because as the acidity or alkalinity change, essential nutrients can become bound in chemical compounds that make them unavailable to plants. Different species of trees have different pH tolerances, but generally, a range of 6.0 to 6.5 is favorable to most plant growth.[4]

The Reality of Urban Soils

Unfortunately for us as urban and community foresters, the idealized soils described thus far are often not to be found where we do our work. In the "natural" forest, it is Mother Nature who plays the dominant role in determining soil health through her processes of weathering, organic matter accumulation and decomposition, pH buffering and biological activity. In urban centers, humans are often the principle actor influencing soil health.

Let's consider just three of the ways that humans can have a negative impact on urban soils.

1. **Compaction** – when soils are compacted by construction equipment, road resurfacing projects, or even pedestrian traffic, those all important pore spaces are crushed. This reduces the ability of the soil to hold water and air and can make it extremely difficult for tree roots to penetrate the soil for growth. Soils comprised of a variety of particle sizes, such as loams, may be more vulnerable to compaction because the smaller particles fill in large pore spaces between coarse particles.[5]

2. **Lack of Organic Material** – Urban top soils are often removed for construction projects and, if they are returned, the organic content of the fill is often deficient. Organic material supports the development of healthy soil structure by providing glue like substances that bind soil into aggregates. Lack of organic matter interferes with soil structure, leading to a compacted soil that inhibits root growth. Further, lack of organic matter decreases the activity of beneficial soil organisms and can lead to nutrient deficits as soil nutrients that would be replaced by the breakdown of organics are not restored to the soil.[6]

3. **Contamination -** Urban soils are often disturbed many times over the years for construction projects, road resurfacing work and utility maintenance. In many of the projects, materials that can change the chemical activity (pH) of the soil or interfere with the soil structure are introduced into the soil regime. Materials commonly mixed into

urban soils include sand, gravel and tarry/oily substances from road projects, concrete and cement as construction debris and hydrocarbons (gas and oils) from road surface runoff. Other contaminants might include glass, metals, trash and substances discarded by individuals directly into tree pits and open soil surfaces. All of these materials can degrade the health of the soil and interfere with tree growth and vitality.

Now, think of the typical urban setting around a typical urban tree. That tree is likely growing in a soil with minimal organic matter. How common is it for leaves and other natural organic litter to be left under urban trees? Think of the impact this lack of organic material will have on the structure of the soil. That tree is probably planted in a site that has seen at least one and probably several construction projects over the years. The top soil was probably removed to facilitate these projects. If the soil was restored at all, there may have been serious impacts to the structure of the soil including breakdown of the aggregates and compaction of the pore spaces. The site may also be contaminated with one or more of the contaminants cited above.

And, even if there has not been construction, think of the impact of things like tiny little tree pits and their minimal amount of soil, heavy foot traffic under the tree, trash and waste thrown on the soil and even daily visits from the neighborhood dogs. Can we really expect the soils to be in good shape? Can we really expect, given what we know about the intimacy of soil/tree relations, that our urban trees will thrive? I think we might if we take a few common sense steps.

A Few Good Ideas

1. Mulch all newly planted trees and refresh the mulch periodically to maintain an organic layer and organic input to the soil.

2. If practical, mulch older, significant trees occasionally to reintroduce organic matter.

3. Provide adequate protection zones around trees during construction. This will prevent soil compaction. Extend the protection zone as far from the stem of the tree as possible, ideally, out to the edge of the canopy (drip line) or even farther.

4. Ensure that trees to be protected during construction or other landscape projects are surrounded with a fence that clearly delineates the zone of protection. Fencing is generally recommended over flagging and other non-restrictive markers because fences physically keep people and equipment out.

5. If you are involved in a construction project that requires the removal of top soils, be sure to see that good, healthy top soil is returned to the site.

6. Provide natural paths that lead people away from trees and/or reduce scattered foot traffic. You may be wise to wait before introducing permanent pathways to see where it is that people tend to walk around new buildings and other new features in the landscape.

7. Test your soils before you plant trees. If there is a significant deficiency or other problem, consider remedying that problem before you plant. For example, if the soil pH has been altered by the presence of construction debris, consider whether it is feasible and practical to restore the pH to a healthier range.

8. Develop strong tree protection ordinances that consider the health of soils as part of the overall system. Prevention is much preferred to remediation where soils are concerned.

9. Educate work crews, decision makers and the public about the importance of a healthy soil resource.

In conclusion, let's all try to expand our vision to see that the line that separates the tree from the soil is much more blurry than might be perceived at first blush. In effect, the healthy trees that we all admire and work to protect are the upward extension of the healthy soils that lie under them. They are the thin layer of soil reaching up to touch the thin layer of atmosphere and water that together bring life to this our one and only Earth.

Notes:

1. "A Fragile Seem of Dark Blue Light," in *Proceedings of the Global Change Research Forum*. U.S. Geological Survey Circular 1086, 1993, p.15

2. Arborist's Certification Study Guide, International Society of Arboriculture, 2001

3. Arborist's Certification Study Guide, International Society of Arboriculture, 2001

4. Arborist's Certification Study Guide, International Society of Arboriculture, 2001

5. Arborist's Certification Study Guide, International Society of Arboriculture, 2001

6. Soil Science Simplified, Helmut Kohnke, Waveland Press, 1994

Picks and Shovels

Soils Information and Technical Resources from the US Natural Resources Conservation Service, http://soils.usda.gov/

Paxton – the State Soil of Massachusetts, read about it at ftp://ftp-fc.sc.egov.usda.gov/NSSC/StateSoil_Profiles/ma_soil.pdf

Proper Mulching Technique - www.ces.ncsu.edu/depts/hort/consumer/factsheets/trees-new/text/muching.html

Soil Testing Services - http://www.umass.edu/agland/services/soil_testing.html

Sample ordinances and sub-division regulations from some Massachusetts communities. www.mass.gov/dcr/stewardship/forestry/urban/urbanFAQs.htm#ordinance

A Guide To Developing A Community Tree Preservation Ordinance, from the Minnesota Shade Tree Advisory Committee.
http://www.mnstac.org/RFC/preservationordguide.htm

Special Note: Due to consolidation of space and equipment within the DCR Boston office, Jane Calvin will no longer have a phone line at this location. Jane works in the Northeast of the state and can best be reached on email at urbanforestry@prospeed.net You may also contact Eric Seaborn at eric.seaborn@state.ma.us or 617-626-1468 with messages for Jane. Eric will be sure to pass them on to Jane.

Growing Greener

City of Pittsfield - The city has found a valuable ally in promoting and caring for its urban forest. Since it's beginning in 2004 **Pittsfield Tree Watch** (**PTW)** has put Pittsfield's trees in the spotlight acting as a tireless advocate promoting, planning and educating the community on the importance of the cities park and street trees. This active group of citizens shares the common goal of improving the urban forest and the green infrastructure of Pittsfield.

Some of **PTW's** highlights from the past two year include: initiating the first street tree survey in Pittsfield, securing a 2005 Heritage Tree Care Grant through DCR to care for 5 important city trees, helping Pittsfield attain Tree City USA designation and re-establishing the American elm at Hebert Arboretum in Springside Park, a historic city landscape. Current PTW projects include hosting a tree planting workshop in October, collaborating with the city on a more thorough tree inventory and incorporating it into the city's GIS database, and a Trees for Life project to plant 250 trees for Pittsfield's 250th anniversary. For more information about **Pittsfield Tree Watch**, please contact Astrid Hagenguth, hagenguth@yahoo.com. 413-445-5508 or 212-988-6157

Growing on Trees

The Mass. Department of Conservation and Recreation (DCR)'s Greenways and Trails Program in partnership with the Executive Office of Transportation (EOT) has just posted a call for proposals for **Recreational Trails Grant** projects, with a **deadline** for proposals of October 2, 2006. For more details on the Greenways and Trails Program and the Recreational Trails Grants, please visit
http://www.mass.gov/dcr/stewardship/greenway/index.htm.

National Urban and Community Forestry Advisory Council (NUCFAC) Grants available – NUCFAC will award approximately 1 million in grant funds to projects that have a national or widespread impact and application. Grants of any dollar amount up to the 1 million dollar limit will be considered. For more information, contact Suzanne M. del

Villar, Executive Assistant to the Council, at 909-585-9268 from 7am to 5pm Pacific Standard Time.

National Grid Grants: if you reside in the communities of **Nantucket, Douglas, Hawley, Adams, Heath, Uxbridge, Billerica, Rowe, Charlemont, Topsfield, Wenham, Norwell, Andover, Hanson, Pembroke, Wilbraham, Pepperell, Lancaster, or Haverhill** your community is eligible to access funds through the DCR – National Grid Partnership Challenge Grants funds. For more information, please visit the DCR National Grid Partnership grant section of our web site at: http://www.mass.gov/dcr/stewardship/forestry/urban/urbanGrants.htm

Community Inventory Guide available: Using grant funds from the DCR, the University of Massachusetts in cooperation with the City of Springfield and the USDA Forest Service has developed a booklet entitled *Community Guide: Urban and Community Forestry Inventories*. This useful guide leads communities through the steps necessary to complete a community forest inventory, covering issues including urban forestry management tools, inventory types, how to complete the inventory and many more. If you would like copies for your community or group, please contact Eric Seaborn at 617-626-1468 or eric.seaborn@state.ma.us

On The Horizon

DCR Tree Stewards Training: Our annual Tree Stewards Training Program will once again be conducted at the Harvard Forest in Petersham. The dates for the 2 day training are November 3rd and 4th. Overnight accommodations for up to 25 people are available at the Harvard Forest on a first come first served basis. Please note that, because of the lay out of the Harvard Forest buildings, you may be asked to share a room. The cost of the training is $95.00 which will include all meals and a room reservation or $45.00 to attend the training without a room reservation. Checks should be made out to **Mass ReLeaf Trust Fund**. To register for the training and to reserve a room for overnight stay, please contact Alan Snow at 413-577-2966 or alan.snow@state.ma.us

Citizen Forester of the Year: Do you work with or know someone who has demonstrated exceptional devotion to their community forest? Would you like to see that person recognized for his or her efforts? In conjunction with our annual Tree Stewards Training Program, we will be honoring Outstanding Citizen Foresters. This will the be the third year that we have presented this award that recognizes the commitment and passion of professional and volunteer community forestry managers and advocates who go above and beyond the call to care for their community resources. Please submit nominations by email to Eric Seaborn at eric.seaborn@state.ma.us The nomination should give a brief summary of the person's accomplishments and your reasons for nominating him or her for the award. **Nominations must be submitted by October 20, 2006.**

Tree City USA – It's Never Too Early to Start – A friendly reminder that Tree City USA applications and re-certification documents are due by December 31, 2006. If your community has not participated in this program in the past but you would like to try for this year, please visit the Tree City USA portion of our web site at

http://www.mass.gov/dcr/stewardship/forestry/urban/urbanFAQs.htm#treeCity We are pushing toward our goal of 100 Tree Cities in the next few years and we are ready to help you attain this valuable public relations recognition award. Please contact Jane Calvin, Alan Snow or Eric Seaborn for details and assistance (contact information at the end of this newsletter).

Six Views of the Urban Forest, Lecture Series: The Lexington Tree Committee is sponsoring a series of lectures on urban and community forest issues. All events are free, made possible through a grant from DCR and will be at the Lexington Carey Library at 7:30 p.m. Contact John Frey at jwfrey2@aol.com. Series includes:

- September 13, 2006: Bill Cullina, Director for the New England Wildflower Nurseries will make a presentation entitled *"In Homage to Woody-Native Trees for the Urban Forest and Garden."*
- October 18, 2006: David Pinsonneault Lexington's Superintendent of Public Grounds and Tree Warden will speak on *Implementing a Tree Management Program in Lexington*.

2004 Nobel Peace Laureate Dr. Wangari Maathai to speak in Boston: Please save the date for a unique opportunity to see and hear from one of the world's foremost community forestry advocates. Dr. Maathai will share her vision of grass roots environmental stewardship, citizen empowerment and human rights on October 24 at 7pm at Boston's historic Faneuil Hall. Information about tickets will be available soon. There may be opportunities for low or no cost admission for a limited number of seats. We will notify you with further details ASAP. To find out more about Dr. Maathai and the *Greenbelt Movement* that she founded in Kenya, please visit http://www.greenbeltmovement.org/

Fall 2006 Safetrees, LLC Workshop "TREE HAZARD & HABITAT". Sturbridge Host Hotel & Conference Center, 366 Main St., Sturbridge, MA. Monday, October 9, 2006. 8:30AM-4:50PM. **(Pre Announcement: save this date or register now!)**
A collaborative seminar series: "International Perspectives on Tree Risk Assessment, Biomechanics, Veteran Tree Management, & Influences from the UK derived from the Study of Ancient Trees & the Aging Process". *Presenters; Ed Hayes, Safetrees, LLC, US & Neville Fay, Treework Environmental Practice* and Chairman of the Ancient Tree Forum*, UK.* For more information, contact 507-282-5739, or e-mail, ehayes@safetres.com

Empire State Green Industry Show November 14-16, 2006, Rochester Riverside Convention Center, Rochester, NY. This is a combined education conference and trade show of the New York State Arborists, ISA Chapter Inc.; New York State Turfgrass Association; New York State Nursery/Landscape Association; and New York State Flower Industries. For details, contact Jill Cyr at 518-783-1229, 800-873-8873, jill@nysta.org, or www.nysta.org.

Upcoming Conference; "Storms Over the Urban Forest - Storm Preparedness and Response Planning": Sept. 26, 2006 Radisson Airport Hotel, Providence, Rhode Island
Sponsored by the Rhode Island DEM, Rhode Island Tree Council and the USDA Forest Service.
This workshop is intended to help communities prepare for natural disasters, respond appropriately when a disaster occurs and help the urban forest recover from the damage. Speakers will cover administrative and planning issues, as well as tree care techniques that will help communities be better prepared when a storm strikes their urban forest.

Who Should Attend?

Municipal Officials
Tree Wardens
Consulting Foresters
Tree Board Members
Volunteer Tree Group Members
Arborists

Cost: $50 Registration Includes Lunch and Breaks
Date: Sept. 26, 2006, 9:00 – 4:00 Location: Radisson Airport Hotel, Providence, Rhode Island More Details and Registration Forms will be available soon. For More information contact; Paul Dolan, Rhode Island DEM – 401-647-3367, pdolan@ridem.necoxmail.com

Species Spotlight

***Juglans cinerea,* Butternut**

This medium to large sized tree is native to the eastern United States and is hardy to zone 3. This tree has a wide, spreading crown and stiff, upright branching pattern with alternate, pinnately compound leaves. Fall foliage is yellow. The fruit of this tree is a nut that is covered with a sticky, hairy covering. The seeds are oily and edible.

Advantages and Limitations:

Hardy to zone 3 this tree is a slow grower that prefers moist, fertile soil and full sun. The fruits can be messy and the species is susceptible to canker, but in an open setting, it is a beautiful large tree. **Special Note:** Considered a threatened species in most of its native range the Butternut is being killed by the fungus, *Sirococcus clavigignent-*


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